

CASSINI ENCOUNTER WITH EARTH: PLANETARY MAGNETIC FIELD MEASUREMENTS

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The Cassini orbiter passed within 1172 km of Earth on 18 august 1999 enroute to Jupiter and Saturn. Direct measurements of the geomagnetic field magnitude were made by the Helium Magnetometer which was operated in the scalar mode in which the Larmor frequency is obtained along the trajectory. The frequency is converted to very accurate values of the field magnitude using an atomic constant (the gyromagnetic ratio). This mode was activated when Cassini was within 4 radii of Earth and operated in fields from 300 to above 22,000 nT. The Earth encounter is a unique opportunity to demonstrate the performance of the magnetometer in this mode of operation in preparation for subsequent measurements at Saturn which will be the first of this kind at a planet other than Earth. The measurements have been compared with high order models of the geomagnetic field obtained from previous satellite and Earth-based field observations. The comparison consists of removing moments of the field one at a time up to high orders so that their contribution to the measurements and the accuracy achieved in making the measurements can be assessed. In addition, the contribution made by the magnetospheric ring current has been identified.

EGS april 00